GOLD RAY HYDROELECTRIC PROJECT
Spanning the Rogue River
Tolo vicinity
Jackson County
Oregon

HAER OR-164
HAER OR-164

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

FIELD RECORDS

HISTORIC AMERICAN ENGINEERING RECORD
PACIFIC WEST REGIONAL OFFICE
National Park Service
U.S. Department of the Interior
909 First Avenue
Seattle, WA 98104

HISTORIC AMERICAN ENGINEERING RECORD

OLD RAY HYDROELECTRIC PROJECT
HAER No. OR-164

Location:	The Gold Ray Hydroelectric Project, at 8628 John Day Drive, Central Point, Oregon, occupies a 26.02 acre site on the Rogue River, north of the unincorporated town of Tolo, in Jackson County, Oregon. The site is designated as Tax Lot 300 on Jackson County Assessors Plat 362W18 and is shown on the Sams Valley USGS 7.5′ quadrangle (Provisional edition, 1983). The site UTM references are Zone 10, North (y) (meters): 4698244.760, East (x) (meters) 501310.504
Date of Construction:	1902-1904, 1941, as modified
Designer/Engineer:	Hunter, W.F. (site geology, 1902) Gault, J. L. (Construction Superintendent, Aug-Dec, 1902) Howard, J.S. (Construction Superintendent, Dec 1902-04) Boyle, John C. (Engineer, 1941)
Builder:	Condor Water & Power Company (Col. Frank H. and Dr. C.R. Ray) California Oregon Power Company
Present Owner:	Jackson County Roads & Parks Department
Present Occupant/Use:	Vacant/Not in Use
Significance:	The Gold Ray Hydroelectric Project, consisting of the Gold Ray Powerhouse, Dam, Fish Ladder and associated features, was the first hydroelectric facility on the Rogue River and the first large-scale generation plant in southern Oregon. Construction of Gold Ray provided reliable electricity to the majority of cities in the southern Oregon and marks the beginning of the regional private utility that still serves the area. Built between 1903-1904 and continuously operated with only minimal modification until 1972, Gold Ray remains a largely intact example of early electrification and hydroelectric plant design in Oregon. In December 2009 the Gold Ray Hydroelectric Project was determined eligible for listing on the National Register of Historic Places under eligibility criterion "A."
Report Prepared By:	George Kramer, M.S., Kramer & Company, Ashland, Oregon For Jackson County Roads and Parks Department
Date:	August 2010

PART I. HISTORICAL INFORMATION

The Gold Ray Hydroelectric Project is located upon the main channel of the Rogue River north of Medford, Oregon in the vicinity of the unincorporated town of Tolo. Construction between 1902 and 1904 made Gold Ray the first large scale hydroelectric generation facility on the Rogue River, and the first large plant in Jackson County, Oregon. The project consists of multiple resources, including most prominently the Gold Ray Dam, the Gold Ray Powerhouse and the fish ladder. Other minor resources, including the forebay, headgates, and several building pads and stone retaining walls, relate the historic development of the property and are associated with the project and its operation.

CONTEXT:

Construction of the Gold Ray Hydroelectric Project, the first effort to dam the Rogue River for power generation, began in 1902 and the plant first transmitted power to Medford, Oregon in late 1904. The Gold Ray Hydroelectric Project represents the first large-scale hydroelectric plant in Jackson County, Oregon.[1]

Development of the project followed the consolidation of multiple parcels lining both sides of the river under the ownership of Dr. Charles Reginald Ray and his brother, Colonel Frank H. Ray. Dr. Ray, from Chicago, had migrated west to search for gold in Alaska. In 1897 Dr. Ray headed home through the Rogue River Valley at the request of his brother, who had mining investments in the Medford area . Ultimately Dr. Ray, with financial backing from Col. Ray, owned several large mines in the vicinity of the Gold Ray site, most particularly the Braden Mine, which the Rays purchased from Dan Condor.[2] Determining that their mining operation would be more efficient with electric power in place of the steam engine that was then being used to drive the mine's stamp mill, the Ray brothers sought a site on the Rogue River suitable for the development of a hydroelectric facility. Between 1899 and 1902 through a series of additional purchases they acquired several thousand acres of land along the river upstream from the town of Gold Hill, ultimately owning both sides of the river for distance of four miles.[3]

By July 1902 the Ray's formed the Condor Water and Power Company, taking up an idea to develop a dam and powerhouse that may have been initiated by Dan Condor. Col. Frank H. Ray had been successful in a variety of business ventures ranging from large mining operations in both Arizona and Mexico, to owning the patent on the "Ray-Cycle" bicycle. "The master achievement of his life was the formation of the Consolidated Tobacco Company, afterwards absorbed by the American Tobacco Company."[4] While some reports indicate that the Ray's raised capital in New York, through

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[1] A group of investors formed the Ashland Electric Light and Power Company, in Ashland, Oregon, and were generating hydroelectricity on Ashland Creek by 1889. In 1904 the City purchased their interest and four years later, in 1908-09, built a new powerhouse on the Reeder Reservoir capable of generating 300-kw of power. The Ashland Municipal Powerhouse was listed on the National Register of Historic Places in 1987 (NRIS #87001563).

[2] As early as 1897 the Braden Mine was a fairly large scale operation, employing ten men. "The ore from this mine keeps a 5-stamp mill running steadily" (See Oregon Mining Journal, 1897:58).

[3] Legal Papers of C. R. Ray, 1899-1923, Southern Oregon Historical Society Manuscript 435.

[4] "Late Colonel Ray Great Factor in Local Prosperity," *Medford Mail Tribune*, 15-April-1925.

Col. Ray's business connections, his own wealth likely provided sufficient means to both purchase the river front property and to develop the power project with little outside assistance.[5]

Prior to the construction of the Gold Ray Dam, the city of Medford had relied upon a wood-fired boiler to produce steam for electric generation, a system that lacked reliability and sufficient capacity for the growing community. While Ashland had a small hydroelectric generation plant in place by the 1890s, most other communities in southern Oregon prior to 1904 were either entirely without electrical generation or had small, private, facilities of limited capacity, usually associated with industrial operations.[6] Mining dams, including most notably the Golden Drift Dam (also known as the Ament Dam), near Grants Pass and a planned dam near Gold Hill, were considered potential hydroelectric sites, but none were put into generation due to the financial and technological challenges such works represented during this pioneer period.[7] The Ray's proposal to build an entirely new dam on the Rogue River specifically for hydroelectric generation was unprecedented both in concept and scale.

Beginning in late 1901, the Ray's retained W. F. Hunter, a civil engineer, to make a "correct map" of the Rogue River from its source to its mouth. "He started out upon his trip in a small boat with one assistant and in thirty-two days he had made the entire trip."[8] Hunter's detailed map of the riverway, reported as among the most detailed up to that time, confirmed that sufficient flow could be maintained at the rocky channel the Ray's had selected for the dam. Preliminary work at Gold Ray began in late Spring and by August 1902 J. L. Gault, of Medford, described as "…an experienced engineer…," was hired as the superintendent of the works, focused upon a dam that was to be "…built with a frame work of timber, tiled in rock, and will be about 20 feet in depth."[9]

The proposed construction at Gold Ray was greeted as a major investment and anticipated with considerable excitement in Southern Oregon. The dam "…bids fair to make a new era in the development of Southern Oregon….From this plant electric light and power can be furnished to every town in the valley…"[10] Still, some doubt remained about whether the Ray's could successfully control the Rogue River behind a dam to produce electricity. There was also opposition due to the dam's perceived impacts on fishing.[11] Others just didn't think the project, or the Ray

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[5] "Colonel" Frank Ray served as Vice-President of the American Tobacco Company and was considered a very wealthy individual by the standards of the day. Upon his death his estate was estimated at more than $2.5 million, the equivalent of more than $100 million today. Based upon deeds on file, the extensive river property in Jackson County acquired by the Ray's between 1899 and 1902 cost less than $30,000 total (See SOHS MS 435).

[6] Many early electric providers were industrial mills or other facilities that relied upon boilers for their operation. Often early electric power was only available to others during night-time hours, when the mill itself was closed and the boiler was kept running to produce power and, for the mill owner, an additional source of income.

[7] What is arguably the first the modern hydroelectric facility in Oregon, Station A, was built in 1889 at Willamette Falls, on the Clackamas River in Oregon City, and generated a meager 480kW, or 1/3 of the initial output of Gold Ray. Smaller communities such as those in southern Oregon did not develop electricity until much later, and then, typically, only at a very small scale such as at Ashland (Wollner, 1990:26).

[8] *Medford Mail*, 7-February-1902.

[9] "Work on Big Power Plant," *Ashland Daily Tidings*, 11-August-1902, 3:2. Early references to the project refer to the dam at Tolo, or the Ray's dam on the Rogue River. The exact derivation of "Gold Ray" is not known but is assumed to be have been the result of the mining operation and the proponents. Some later sources that refer to the site as Gold REY have no historical basis that can be determined, other than a non-historic residential subdivision, Gold Rey Estates, that developed along the access road after World War II.

[10] "A Great Enterprise," *Medford Mail*, 29-August-1902, 3:2.

[11] See *Medford Mail* 29-June-1904, 19-August-1904 and 26-August-1904.

brothers, could succeed. In general though, the public seems to have been interested and excited by the prospect of a large electric plant. On 1-September-1902 the Ray's held an elaborate dedication ceremony, with special trains from both north and south converging on the dam site and bringing some 1000 persons to the witness the events.

> The salute of 100 guns was a continuous performance…Dr. Ray and his assistants had made excellent arrangements for the reception of visitors. A large pavilion had been erected with a roof of boughs, a speakers' and band stand at one end, and a floor which when cleared made a splendid dancing platform.[12]

> The proposed water power project will be of great value to this section of the country. The preparatory work on the dam is well advanced, but it will take about two months longer to complete the work….The dam is located at the most natural place and will be 426 feet across and 20 feet in depth, forming a bank of water about a quarter of a mile across and extending some distance up the river.[13]

By late 1902 J. S. Howard, often considered the "Father of Medford" and among the town's earliest leaders, was identified as the engineer and superintendent of the construction for the Gold Ray Dam, apparently having succeeded Mr. Gault.[14] By that time construction has progressed to the point where an electric light plant of some sort was in place, providing on-site power for twelve arc lamps that were "scattered about the works, making the place as light as day."[15] Later that month Dr. Ray placed large display ads in the newspaper, seeking "first class carpenters" and logging teams, offering between $3 and $4.50 per day. In early November 1902 some 200 men were at work on the site, employed in both day and night shifts, aided by the "brilliant illumination" of the arc lamps.[16] Later in November some 370 feet of the proposed 419 foot long dam was complete, with the work being pushed "…as fast as the weather conditions will permit."[17] This reference refers to the coffer dam, diverting river flow away from the site so as to allow construction of the actual timber crib dam the Ray project would finally include.[18]

Before the end of the year a right-of-way corridor had been cleared from "…across the mountains across from the [Braden Mine] mill to the dam at Tolo for the transmission of power to the mine.[19] Progress apparently slowed due to the weather and the difficulty of excavating the solid rock at the

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[12] "Dedication of Dr. Ray's Dam," *Ashland Daily Tidings*, 4-Sept-1902, 3:3.

[13] "City Happenings," *Medford Mail*, 5-September-1902, 3:1.

[14] James Sullivan Howard (1832-1919) and his son Charles surveyed the original plat of Medford in 1883. J.S. Howard then served as the community's first postmaster, which was housed in his storefront on Main Street, and, when the city was incorporated, served as "President" of the new Town Council (http://id.mind.net/~truwe/tina/, visited 19-July-2010).

[15] See *Medford Mail*, 10-October-1902,. Realistically it is unlikely that either Gault or Howard had the technical expertise to actually design the works for the Gold Ray project, which relied upon new technology that neither men would logically be familiar with. Hunter, the civil engineer who surveyed the Rogue River, may have worked out the basic plan for the dam and forebay however the design of the actual generation system most likely came from its supplier, probably General Electric.

[16] "The Ray Dam," *The Jacksonville Democratic Times*, 6-November-1902, 1:2.

[17] "City Happenings," *Medford Mail*, 21-November-1902. The discrepancy between the overall length from September, 426 feet, to this dimension, reduced by seven feet, is not explained

[18] See *Medford Mail*, 12-December-1902, 3:1, which states that the cofferdam at Tolo is being built with logs from the Gold Hill area, and being used for temporary cribs.

[19] "City Happenings," *Medford Mail*, 12-December-1902, 3:1.

river's bottom, complicated by minor damage from a January 1903 flood that carried "…one section of the dam and a boiler belonging to the sawmill plant…" down river.[20] Construction problems continued. In May 1903 the paper reported that a 60 foot high derrick collapsed while hoisting a rock from the cut that weighed an estimated seven tons. "The strain was so great that the anchorage gave way..." causing the entire machine to fall.[21] The Gold Ray project still pushed forward and by July 1903 fifty men were working on blasting the solid rock for the power station and the forebay, the "race," that would channel water to the turbines.

> The race is 30 feet wide and will be about 12 to 15 feet deep. It is being cut through solid granite… The dam proper is not quite complete but will be as soon as the water in the Rogue River gets a little lower. It is expected that work on the power station building will be begun next month…the wheel pits are now being prepared and it is expected to have this great electric power plant in operation in the early fall … The principal part of the power will be carried to the nearby mining plants, but a lighting plant will also be installed and contracts with will be sought to light Medford, Jacksonville, Central Point and other valley towns.[22]

Winter and spring flooding slowed the construction progress and as late as August 1903, the coffer dam was still underway when the newspaper reported at length on the "big enterprise" on the Rogue River.

> The work of putting in the *artificial dam* is now nearly completed and when that is done the work of completing the *permanent dam* structure will be vigorously pushed…Above the dam the water has been backed up considerably and a good sized lake has been formed…A visit to the dam is well worth anyone's time and a few hours spent in inspection can not but be of profit[23] (emphasis added).

By late Fall 1903 work on the Gold Ray coffer dam was complete and work on the powerhouse house was underway. "Nearly the whole river is now carried around by the race, blasted out of living rock…at the end of the race immense wheels will be placed in a pit blasted twenty-two feet into the sold rock, which will furnish power for dynamos strong enough to furnish electric power enough to run the machinery of the whole valley – and then some.[24] "The powerhouse is now being built – the water wheels and dynamos are on the ground and just as soon as the powerhouse is completed these will be placed in position and then the wheels will turn and Dr. Ray's project shall have been accomplished.[25] This description likely relates to the construction of what would become the north wing of the powerhouse (See Part 2, Resource No. 3).

As Gold Ray was progressing, the City of Medford's wood-fired steam generation plant was increasingly having problems and failing to meet the city's needs. In November 1903, the Medford City Council solicited bids from private providers for both water and power and called for a special election to sell the city's existing facilities.[26] Work on the powerhouse at Gold Ray proceeded during

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[20] "Flood," *Ashland Daily Tidings*, 26-January-1903.
[21] "City Happenings," *Medford Mail*, 1-May-1903, 3:3.
[22] "Local Notes," *Table Rock Sentinel*, 10-July-1903, 3:3.
[23] "City Happenings," *Medford Mail*, 28-August-1903, 3:2.
[24] "Ray Dam Nearing Completion," *Medford Mail*, 25-September-1903, 1:1.
[25] "City Happenings," *Medford Mail*, 23-October-1903, 3:2.
[26] See "City Asks for Bids," *Medford Mail*, 6-November-1903, 1:4, and "Council News," *Medford Mail*, 18-March-1904, 3:3.

1904. In late January the turbines were being set and the powerhouse was nearly complete.[27] "The concrete work on the Gold Ray Powerhouse is finished, the turbines and shafts are set and the roof is being rapidly put on.[28] By March the walls of the powerhouse were being plastered.[29]

As interest in power generation grew, the Rays apparently determined that selling power to Medford and other cities in the Rogue Valley, in addition to their own needs at the Braden Mine, represented an opportunity. By March 1904 they were actively pursuing a franchise with the City of Medford to supply its power needs, including construction of a new distribution system. In July 1904 the Medford City Council accepted a proposal from the Ray's and gave their company a franchise "…to plant its poles and run its lines throughout the streets and alleys of the city."[30] The Ray's Condor Water and Power was also to provide water to the city "…sufficiently pure for domestic use and for drinking purposes." The City and the Rays signed the contact in early August.[31] New power lines in the city started to go up later that month.

> The stringing of wires for electric light and power through the valley has caused a great many farmers to commence to figure upon power for pumping water to be used for purposes of irrigation…we are willing to predict that within the next few years the Rogue river valley will be electrified from one end to the other and not one farm out of ten will be found that is not using electric fluid in one form or another.[32]

Most reports document that power was first transmitted from Gold Ray to Medford in December 1904, although some sources date this a month earlier, possibly referring to DC lighting used for streetlights. The first transmittal of AC power logically occurred toward the end of December 1904 or even later after new transformers arrived that would allow the generation to conform to the Medford system.[33] The exact specifications of these generation units isn't clear, although early plans of the powerhouse document that they were powered by typical vertical turbines set in the wheel pits at the powerhouse's northern elevation.

After less than two months of the new operation, the demand for power in Medford exceeded all estimates. To meet that new need, Condor Water and Power ordered entirely new, and larger, generation equipment consisting of two General Electric 750 kW generation units that would produce additional and more reliable power supply for its growing utility business. "When the new machinery is installed the company will be able to generate 1000 horsepower, nearly four times the present capacity of the plant." Based on early plans of the powerhouse, it appears that Condor essentially abandoned the two original "wheel pits" that were located at the northern end of the power house and replaced them with Unit No. 1 and Unit No. 2, each consisting of four (4) 42" horizontal wheels connected in series by a single drive arbor that turned a large lower pulley that in turn connected via multiple rope drive to an upper pulley that then powered Generation Units No. 1 and 2, each of which produced 750 kW. Twin eleven (11) kW exciters, also manufactured by General Electric, were connected to the generators via a heavy belt drive system.

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[27] *Medford Mail*, 29-January-1904, 3:5.
[28] "Gold Ray News," *Medford Mail*, 12-February-1904, 2:2.
[29] "Gold Ray News, " *Medford Mail*, 4-March-1904, 2:2.
[30] "Power and Light for Medford," *Medford Mail*, 22-July-1904, 1:5.
[31] "The Contract is Signed," *Medford Mail*, 5-August-1904, 1:3.
[32] "City Happenings," *Medford Mail*, 19-August-1904, 3:3).
[33] "City Happenings," *Medford Mail*, 3-February-1905, 3:3. See also Taylor, *History by the Years*, 1964.

The powerhouse was enlarged to house the two new units, along with changes to the forebay that allowed Condor to continue to use the original, smaller units, until the new generators were in place. This included the construction of a concrete extension to the forebay wall, shunting water to the south side of the powerhouse, through the new turbine pits, and, ultimately, turning the original race on the powerhouse's north elevation into a backwater or spillway channel. Fabrication and shipment of the new General Electric generation units was expected to take some four months and the new machinery was installed and operational by July 1905.

> The new generator is now running steadily. It is at present supplying Gold Hill with light. The current is taken directly from the generator, the step up transformers not being ready for operation yet.[34]

In short order the Ray brothers shifted their primary focus from mining interests to the more lucrative power utility operation. As early as May 1906 plans were drawn that included foundation work for a powerhouse expansion that would include two additional generation units at the Gold Ray Powerhouse.[35] Condor Water and Power expanded its service area beyond Medford, building transmission lines to a new substations in Grants Pass, Oregon, later extended to service the Greenback Mine, 18 miles further north and in Jacksonville, by 1906. By the end of that year Condor was providing electricity to Ashland, Central Point, and Jacksonville, in addition to Medford, building new transmission lines throughout the valley to provide its service.[36].

The Gold Ray Dam was the centerpiece of what the Rays envisioned as a entire industrial community at Tolo, that included a saw mill, brickyard, and what they hoped would be numerous other facilities. They also saw the area as a recreational center, promoting it through booster publications. As part of the development, the Rays built a large "clubhouse," envisioned as something of a resort site, perched high upon the hill over looking the dam (See Figure 9). Well designed elements such as a temple-fronted water tower, fine coursed stone work and fountains were developed with the intent of attracting visitors who could arrive at the small depot by train and cross the river on the project bridge. Even as late as 1922, Charles Ray was promoting Gold Ray as a potential golf course and recreational area. "Gold Ray affords an ideal location for golf links, as well as the added advantages of boating, bathing, fishing and hunting, besides the scenery of a beauty unsurpassed on the Pacific Coast."[37]

Clearly, however, it was power generation that remained Gold Ray's primary purpose and the operation prospered as electricity became a staple element in Jackson County life. In 1907 Condor Water and Power reorganized and became the Rogue River Electric Company, recognizing the broader reach, and more specific aims, of the company. Dr. Ray remained the new company's president, serving in the same role that he had at Condor, while Col. Ray remained the primary financial backer.[38] In 1908 the company made a major investment in the construction of a new pumping station, designed to improve water supply and irrigation potential at Gold Ray. This included the installation of two new 350 HP waterwheels and a 700 HP General Electric "dynamo"

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[34] "Gold Ray Items," *Medford Mail*, 7-July-1905, 3:3.

[35] See Figure 5, PacifiCorp Image number E546.

[36] George V. "Buck" Taylor. History by Years of the California Oregon Power Company, Unpublished Manuscript, COPCO, 1964.

[37] Ray Papers, SOHS, MS 435.

[38] While Col. Frank Ray was reported as a frequent visitor to Oregon, he remained a New York resident, leaving the day-to-day operations to his younger brother.

to augment the existing facilities[39] While not entirely clear, the water pump system apparently never worked as intended, or at least was not as successful as anticipated. The "dynamo" is believed to be the third generator at the Gold Ray Powerhouse that boosted output by 450 kW, to a total of 1.95 mW.[40]

In August 1911 the Rogue River Electric Company joined forces with two other pioneer utilities in the region: a group from Siskiyou County, California headed by Jesse Churchill that operated under the name "Siskiyou Electric Power and Light" [SEPL] and the Moore Brothers, who were selling power in Klamath Falls from their lumber mill operation. The newly combined company, serving all the major communities in the region, was formed into the California-Oregon Power Company on 1-January-1912. Charles Ray, while still active in Jackson County largely stepped into the background as the Churchill interests took over most of the company's operation. The new company, known as COPCO, would remain the primary power provider in all of southern Oregon for the next half century.[41] Col. Frank Ray died, in New York, in April 1925. The local papers noted that while he never resided in southern Oregon, he played a major role in local prosperity. "[H]e probably did more for the development of Medford and the Rogue River valley than another one man."[42] Dr. Charles Ray, having inherited nearly $500,000 from his brother's estate, along with most of the southern Oregon property, died in Los Angeles on January 26, 1926.[43]

The newly formed COPCO expanded and acquired other generation facilities, particularly several initiated by SEPL on the Klamath River.[44] Later, as it developed and completed facilities at Prospect, on the Rogue, and at Copco 1 and Copco 2, on the Klamath, the comparatively small output of the Gold Ray Powerhouse diminished in importance within the expanding COPCO system.[45] The company continued to operate the pioneer plant, however and its production augmented COPCO's capacity. In 1912, once Prospect was operational, COPCO was able to undertake much needed repairs at Gold Ray, which had by necessity as the valley's primary power source, been run continuously since 1904. "Seven years ago the dam was first filled with water and since that time it

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[39] "Three Carloads of Machinery is Unloaded," *Central Point Herald*, 24-December-1908, 1:2.

[40] Se Taylor, *History by the Years*, 1964. In 1921 this third unit was relocated to the company's Keno Power plant, in Klamath Falls, returning Gold Ray to its "original" 1905 configuration and output.

[41] The 1912 COPCO is known internally as the "Hyphen" company and would be replaced by a second California Oregon Power Company under the control H.M. Byllesby, of Chicago, in 1926. Under Byllesby, COPCO would eventually purchase or merge with utilities serving virtually all of Douglas, Josephine, Jackson, Klamath and Lake counties in Oregon, as well as Siskiyou County in northern California, a sprawling region that would be touted as "Copcoland" by the utility. Byllesby, one of the largest private utility conglomerates in the United States operated dozens of regional providers such as COPCO, including the Mountain States Power Company, that served much of the Oregon coast and portions of the Willamette Valley. In 1947 a group of Medford investors purchased Byllesby's COPCO interests and returned the utility to local ownership, retaining operation until COPCO's 1961 merger with Pacific Power and Light, based in Portland, Oregon.

[42] "Late Colonel Ray Great Factor in Local Prosperity," *Mail Tribune*, 15-April-1925.

[43] *Central Point American*, 4-February-1926, 3.

[44] SEPL's small Fall Creek Powerhouse, located on Fall Creek, a tributary of the Klamath, was built in 1902-03 and expanded to three units in 1910, remaining among the oldest private power facilities in the former "Copcoland" area. Fall Creek was Determined Eligible for listing on the National Register of Historic Places in 2003. The Ashland Municipal Powerhouse, on Ashland Creek, was completed in 1909, replacing an earlier structure. NR-listed, it too remains in operation and is considered the oldest municipally operated powerhouse in Oregon.

[45] Each of the four units at Copco 1, for example, begun in 1912 and completed in 1918, generated 10,000kW, for a total of 40,000kW compared to Gold Ray's total generation capacity of 1500 kW

has been necessary to keep in at full head to supply power the valley….now it is possible to shut down this plant…while the repairs are made."[46]

Minor changes at the Gold Ray site continued throughout the 1920s and 1930s, most involving the simplification of project operations and the removal of structures associated with the larger industrial and recreational vision of the Ray's. Other work continued the serial improvement and replacement of fish ladders and fish passage-related elements of the project. These included plans for a new fish ladder as early as 1912, the installation of electric fish screens at the tailrace and the construction of another new fish ladder in 1932.[47]

Less than a decade after its completion, COPCO undertook major repair work to the log dam at Gold Ray that included raising its head "somewhat."[48] Still, by 1928 the Gold Ray Dam was beginning to leak severely, requiring regular sandbagging and additional bracing. COPCO looked into replacing the dam as early as September 1924, and considered increasing generation capacity at Gold Ray in the 1930s but determined to keep the Gold Ray operation "as-is."[49] By 1940 the log crib dam had deteriorated to the point that COPCO announced plans to rebuild it.[50] Plans prepared by the company under the direction of long-time company engineer John C. Boyle, proposed an entirely new concrete dam slightly downstream from the old log crib structure.[51] Construction on that dam started in July 1941 and was completed by December. COPCO made other improvements at the Gold Ray site during this period, most notably the construction of yet another fish ladder to provide for passage over the new dam.[52] Upon completion of the concrete dam, the log crib dam located upstream was submerged and while portions of it were apparently burnt prior to the removal of the coffer dam, most remained (See Figure 15). The downstream face of the logs were later, at some undetermined time, partially reinforced with gunite or a sprayed-on concrete material.

During the early 1950s, as power demand throughout much of Oregon grew critical under pressure from expanding population and the post-war expansion of the timber industry, COPCO one again explored the possibility of enlarging the Gold Ray Project to increase its generation capacity. During 1953-54 the company commissioned engineering studies and solicited proposals to add two additional units in the unused turbine bays south of the powerhouse, while retaining the 1905 units. "The 1954 proposal was reviewed in 1956 and again in 1963."[53] Economically impractical, this project was not pursued, and Gold Ray continued with its unusual rope-driven generation units.

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[46] *Central Point Herald*, 24-October-1912.

[47] See *Central Point Herald*, 22-August-1912, *Mail Tribune*, 10-April-1928, and *Central Point American*, 26-May-1932.

[48] *Central Point Herald*, 24-October-1912.

[49] See Copco Drawing E-3530, Wehner, 1930.

[50] "Copco Will Spend Over $1,000,000," *Medford News*, 5-January-1940, 1:5.

[51] John Christie Boyle, born in Siskiyou County and educated at Stanford, was hired first by the Siskiyou Electric Power and Light Company and came to COPCO during the merger in 1911. Over the next half-century, Boyle would be responsible for the design and construction of virtually every hydroelectric project in southern Oregon, including the Prospect, North Umpqua and Klamath projects. Continuing as the Vice President in charge of hydro engineering at Pacific Power after 1961, the Big Bend development on the Klamath River was renamed in his honor upon his retirement.

[52] *Central Point American*, 26-May-1941.

[53] Although rated for a total capacity of 1500 kW (two units at 750kW each), a turbine problem at Gold Ray reduced maximum plant capacity to 1250 kW beginning on 22-May-1957. See PacifiCorp Archive, PDX.023266/407.2.

In 1964 the steel truss bridge that dominates most early postcard views of Gold Ray was washed out in the Christmas Day Flood. A Pacific Power & Light employee, reporting upon the damage, answered, in reference to the question "what about the steel bridge" replied curtly, "Gone, piers and all."[54] In 1970, for the last time, Pacific Power & Light again evaluated the possibility of rebuilding and enlarging the Gold Ray plant, which by then had become something of an oddity within their power system and was reportedly one of only two rope-driven power plants still in operation in North America.[55] As before, upgrades to Gold Ray were determined to be not economically feasible. Gold Ray's small output, and its odd design with horizontal turbines and rope-driven generation units, made it increasingly complicated for the company, as fewer and fewer employees retained the specialized skill of maintaining its operation. Pacific Power, which inherited the project along with the rest of COPCO, began to explore other options for the Gold Ray site.

> Pacific wants to turn the plant and its scenic backwaters…over to public ownership and is negotiating with Jackson County to do so….Representing PP&L in the negotiations is Larry Espey, recreation facilities director, who indicates there is considerable interest by local residents to keep Gold Ray intact as a historical museum….[56]

In 1972, after several months of negotiation, Pacific Power & Light donated the Gold Ray Hydroelectric Project to the citizens of Jackson County, Oregon. "On April 19, 1972 the Jackson County Board of Commissioners took formal action to accept Pacific Power & Light Company's offer to transfer the Gold Ray Dam and adjacent properties to Jackson County ownership."[57] Pacific Power retained rights to the transmission line through the parcel, as well as removing some newer and "usable" materials from the site that included 1800' feet of rope, station batteries, and fuses. The company also removed the switchyard and several smaller structures. In May 1972 Pacific Power & Light formally submitted an application to surrender its operating license for the Gold Ray plant to the Federal Energy Regulatory Commission, stating that "The Gold Ray plant is obsolete and Pacific has determined that its continued operation would be uneconomic."[58] Gold Ray, the first hydroelectric plant on the Rogue River and the first large-scale plant in southern Oregon, a plant that began to generate electricity six years before Pacific Power & Light was formed, was shut down. FERC issued a Notice of Approval for the surrender of the Gold Ray license, marking the formal cessation of activity under FERC License No. 1029 on 8-August-1972.

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[54] PacifiCorp Archive, PDX012073.

[55] "Gold Ray-Unusual Rope-Driven Plant to Retire; PP&L Offers Historical Site to County," PP&L Bulletin, 1972. This PP&L statement can not be specifically corroborated. The 1882 Milltown Dam Hydroelectric Station, located in New Brunswick, Canada, remains in operation and is still rope-driven. Many other early plants were also rope driven but most have been modified and modernized or are no longer in service

[56] Op cit.

[57] Larry Espey, Letter to J. Y. Landing, PacifiCorp Archive, PDX.023266/407.2.

[58] PacifiCorp Archive, PDX.023266/407.1.

PART II. ARCHITECTURAL AND ENGINEERING INFORMATION

The Gold Ray Hydroelectric Project consists of multiple resources located upon the 26.02 acre parcel that was donated by Pacific Power and Light to Jackson County, Oregon in 1972. Built resources are generally limited to the remaining hydroelectric generation facilities themselves, while numerous site features, including foundations, landscaping features, and similar, relate former uses of the site.[59]

The following list documents the built resources associated with the Gold Ray Hydroelectric Project, including information on construction, design, known alterations, and current condition. Information on documented resources associated with the project that were removed prior to 2010 are included in a separate section at the end, identified by italicized titles.

1. Gold Ray Log Dam (1903-1904): Built of stacked logs with rock cribbing, this crescent-shaped dam was located just upstream from the 1941 dam. With an overall length of 426 feet, the log crib dam had a crest at 1146′ above sea level, with a variable height between 30 and 15 feet above river bottom. J. S. Howard supervised the original construction process and the dam was completed in 1904, with a major upgrade in 1908 that may have raised the head somewhat to the above dimensions.. It remained in use until replaced by the present Gold Ray Dam in 1941. The log dam was partially burned in 1941 and at some unknown time post-1941 was partially re-surfaced with concrete/gunite. Portions of the structure remain submerged upstream of the concrete dam that replaced it (See Figures 9 and 13).

2. Gold Ray Dam (1941): Designed under the supervision of John C. Boyle, Chief Engineer for COPCO, this dam was completed in late December 1941. Overall crest length is 368 feet and height above streambed is 39 feet, with high-water crest height of 1159 feet above sea level. Built of 15-inch thick concrete slabs supported by vertical buttresses spaced on 15′-0″ centers,, the Gold Ray Dam abuts the forebay wall on its eastern end (See Figures 14 and 15).

3. Gold Ray Powerhouse (1903-1905, as modified): Built of concrete with a stucco coated exterior, this is a roughly u-shaped structure with the main volume 80′ long and varying between 35′ and 45′ wide. The building foundation is of poured concrete forming massive "cells" or enframed openings for the turbines. Original walls (at the north) are approximately 36″ think, rising from bedrock to the floor level. Side walls on the 1905 portion are somewhat narrower, approximately 24″ wide. Construction details indicate sequential not concurrent design.

   The powerhouse roof is a complex hip with a central monitor or vent, all built of heavy timber-framing, incorporating what was probably first designed as smaller rectangular hipped-roof volume that occupies the northern wing. Clad with corrugated galvanized metal, original roofing was apparently red asphalt shingles.

   The powerhouse is located between the forebay and tailrace, with a single power-floor level located above the canal and turbines levels below the wood-plank main

[59] Most in stream features associated with the Gold Ray Dam, Powerhouse, and Fish Ladder were removed to improve fish passage on the Rogue River in 2010.

floor decking. Paired 42" waterwheels are located in four turbine pits to the east of the powerhouse wall, within the Forebay, and are connected via a direct shaft to large drive wheels (the "lower" pulleys), which in turn use an unusual rope-drive system to drive a second or "upper" pulley that is directly attached to the generator shaft. Each of the pulleys is driven by 1,600 feet of 1.75" diameter manila rope, nested into twenty matched pulley grooves. Wicket gates were controlled via a wheel on the interior, actuating an arm visible on the powerhouse's south elevation, that in turn opened or closed the wicket gates, regulated water flow to the turbine pits.

Twin 750-kW vertical generation units, manufactured by General Electric and installed in 1905, along with two 11 kW exciters, are located at the eastern portion of the powerhouse, separated from the upper pulley assembly by a full height poured concrete interior wall. Apparently part of the expansion of the project in 1905 to accommodate these 750 kW units, the powerhouse also included foundations for two additional units to the south, toward the river channel that were never used.

The original 1-½" thick marble-backed switchboard with early 20th century monitor dials and bayonet disconnects is located along the eastern wall. A separate electric-powered pump unit provided for the site's water system, feeding the storage tank located atop the hillside. A hexagonal control booth or "operators house" is located in the building's center. This was built at some unknown time, after the original construction period, probably prior to 1910 based upon design. Originally enclosed with thick glass panels, this small structure offered "….refuge from the constant sound of the generators."[60]

In 1908 the Gold Ray powerhouse was modified by the installation of an irrigation pump at its western end, re-utilizing the original 1904 "wheel pits" from the first power generation units This installation also included a new 450 kV generation unit (designated as Unit No. 3, See Figure 5) that was powered by a 45" vertical turbine while another matching turbine was used to drive a 10" 2-stage centrifugal pump capable of moving 2000 gallons per minute. The 450 kV generator was again rope driven, while the pump appears to have utilized a leather drive belt. An extension to the powerhouse, probably of wood-frame construction with glass windows based on available historic images, was built at the west side of the powerhouse to enclose a portion of this pump operation, rising from a stone foundation that was grafted onto the original 1903-04 concrete. This area was apparently removed and then rebuilt to the present configuration at a time and manner that is not entirely clear (See Figures 5 and 14).

The irrigation project was not successful and the pump was removed (n.d., certainly by 1929, see Figure 12). The small Unit No. 3 generator was relocated to Copco's Keno Powerhouse, on the Klamath River, in 1921.[61] The original turbine pits, at the NW corner of the powerhouse, and the bays that fed them, were closed off with poured concrete stem walls sometime afterward.

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[60] PP&L Bulletin, 1972.

[61] Gold Ray's third unit was relocated to Pacific Power's Fall Creek plant in 1946, where it is believed to remain (See PP&L, 1966) The Keno Powerhouse itself was demolished in connection with the construction of the Keno Diversion Dam in 1966 (Kramer, 2003:5).

As last used for generation in 1972, Gold Ray's powerhouse remained essentially as it was after 1921, with the twin 750kV units as installed in 1905 and the original switching gear, upper pulleys and exciters all remaining essentially "as built" at that time.

4. Fish Ladder & Counting Station (1942, 1961): The present fish ladder appears to be the last modification in a series of ladders located at several points adjacent to the Gold Ray Dam and Powerhouse. As originally built, the first fish ladder at Gold Ray, associated with the log crib dam, was located on the south side of the river channel Fish ladders were constructed at Gold Ray concurrent with the original log dam, in 1904 and that system was either replaced or modified as early as 1912. Minor improvements were made and by 1924, in addition to the original ladder, another fishway was located on the north side of the log crib dam, according to early plans of the site. Yet another fish ladder, or a significant improvement to an existing one, was built in 1932.[62]

The present fish ladder dates from 1941-42 and the construction of the concrete dam. This ladder too, has been modified several times, most recently in 1961, and now runs from the main channel adjacent to the forebay then steps up through a series of concrete weirs or steps before exiting at the east side of the dam, adjacent to the headgates. An exit channel angles from above the counting station toward the center of the river. Poured concrete stem walls, concrete cross ties or beams and modern pipe balustrade are present. In the area surrounding the counting station (see below) are several wing walls, steps, crossings, and landings that may relate to earlier fish passage features at the site. All are located to the south of the stone and concrete wall that forms and contains the forebay below the headgates.

The Oregon Game Commission fish counting station, the first such function on the Rogue River, was built adjacent to the Gold Ray Fish Ladder in 1942, in connection with the construction of the concrete dam. This facility was first used on April 22, 1942.

> …Two men sat atop the fish ladder along the north end of Gold Ray Dam, about to make history. They stared at a white board, placed under water and along side the ladder's base, waiting for a big shadow to dart by. One shadow, one spring Chinook salmon.[63]

Later the Game Commission, now part of the Oregon Fish and Wildlife Commission, built a small shack atop the fish ladder. In 1968 that facility was replaced with a more substantial underwater counting station, a concrete chamber built adjacent to the ladder with a counting window and airlock-type metal door where fish counters could continue to view fish. "The counting format continued virtually unchanged until 1991, when a video system was installed to tape every fish that swam past the

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[62] See *Central Point Herald* 12-August-1912 and 29-May-1913, *Medford Mail Tribune* 10-April-1929 and 22-April-1928, and the *Central Point American* 26-May-1932. An excellent summary of fish ladder modifications and their functionality can be found in "Musings by the Editor," *Central Point American*, 10-September-1942.

[63] *Mail Tribune*, 9-November-2009.

window.[64]

5. Headgates: (1904, as modified): Approximately 50′ wide and located at the head of the forebay, the head gates are built of concrete with steel trashracks. No actual "gate" mechanism survives, but it appears this feature was used to control water flow into the forebay. This function has apparently been removed or relied upon "flashboards" that no longer survive. There are no mechanical "hoists" as would be typical of headgates. A concrete walkway, originally timber, provides access to the fish ladder (See Figures 9 and 22).[65]

6. Forebay (1904-1905, as modified): Approximately 250′ long and of variable width between 50′ and 125′ (+/-) downstream from the headgates, the forebay was blasted from bedrock and is essentially a canal off the main river channel, that diverts water from above the dam, through the turbines and to the powerhouse. According to historic accounts, the northern wall of the forebay is native rock while the western wall is formed by a massive stone (48″ wide, +/-) retaining wall of indeterminate height and variable width that joins a narrower (24″ wide) poured concrete wall as it continues downstream, flaring out toward the river channel. An overflow/spillway area is located at the extreme west, near the access bridge to the powerhouse.

   Based on physical evidence and the historic development of the project, the original forebay design was likely more linear, continuing from the stone wall to the powerhouse, to feed the original turbine pits of the 1904 design (See Figures 8 and 11). When Condor Water and Power Company elected to expand the generation capacity in 1905, it appears that they removed a portion of the coursed stone forebay wall south of the powerhouse and, for the sake of expedience, grafted the narrow concrete wall onto it, flaring out and enlarging the forebay. This expanded forebay sent water around to the south of the powerhouse, where it would feed the four 42″ turbine bays powering Units 1 and 2 (located mid-channel, within a concrete vault), as well as providing space for anticipated future expansion. Even with this modification, water continued to flow around the powerhouse on the north, to the original turbine pits as well, where from 1908-1921 it was used to power Unit No. 3, in the original "wheel pits" located at the NW corner of the powerhouse.

7. Garage/Storage Building 1 (Unknown, c1940, as modified): This gable volume (approx. 15′ x 20′), is located on the rock outcropping uphill from the main entry gate, north of the powerhouse. The small volume is built of wood frame construction with corrugated metal roof and siding. A single remaining door implies a garage or vehicle storage function. This structure does not appear in early views of the project

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[64] Ibid.

[65] A historic photograph (PacifiCorp Image 82-4) shows a wood-framed superstructure above a concrete form in 1928. Labeled "Tainter Gates" other historic plans indicate that this feature was located south of the headgates (which are also shown in plan) and the exact relationship between the headgate and the Tainter gate is uncertain, although clearly both were once present at the site. "Tainter Gates" as typically termed, are a segment of a cylinder mounted on radial arms that can be rotated upon a single pivot point to raise or lower within a concrete or steel housing to control the flow of water. The "tainter gates" at Gold Ray as shown in 1928 do not appear to be typical and it is uncertain what they actually were, or how water was controlled at the headgate by anything other than flashboards fit into heavy metal u-channels mounted on the upstream face.

but a similar volume does appear in 1941 photos, which also show a now-demolished dwelling immediately uphill.

8. Storage Building 2: (Unknown, c1940): This small gable (approx. 10′ x 15′) volume is located immediately east of the forebay and appears to be the same structure located at this vicinity in 1941 images of the project. This volume is built of wood frame with painted corrugated metal siding and rusting metal roof.

9. Water Tank House (1903-04): A round wood stave water tank located on the hill, above the project, and provided gravity fed domestic water supply, as provided by a electric-powered pump located in the powerhouse. Early historic photographs show this feature to have been encased inside a gable roof building with a character-defining columned "temple front" facing the river (See Figures 9 and 12). By 1941 the tank had been either rebuilt or, more likely, the housing removed, to reveal the simple round volume storage tank and a conical roof (See Figure 15). Partially collapsed, a dry laid stone retaining wall or foundation of the Water Tank House remains on the downhill slope, above the clubhouse site.

10. Concrete Slabs & Footings: (n.d., multiple): As documented in postcard and historic PacifiCorp images of the Gold Ray project, multiple buildings of varying size, construction and use, have been built peripheral to the main generation-related facilities. A series of concrete foundation slabs, concrete piers, and other features remain at scattered locations throughout the property with most concentrated between the Forebay and the main project roadway. The specific history and use of these slabs is not clearly understood however they remain to document the former uses of the Gold Ray site.

The following list documents the built resources associated with the Gold Ray Hydroelectric Project removed prior to 2010.

11. *Clubhouse*/Retaining Walls: (1903-04): Early views show a large, two story structure with a shallow hipped roof and two-story wrap-around porches located on the hillside, directly east of the powerhouse (See Figure 9). This building was reportedly built as a "Clubhouse" by the Rays as part of their intent to develop a Tolo recreational area, although it may also have served as worker housing during the original construction period.[66] In September 1903 a local paper announced Dr. Ray's formation of a "Sportsmen's Club," for those people interested in hunting and fishing. "The idea of the organization is to build and equip a club and boat house on the lake formed by the dam of the Condor Water & Power Company…"[67] A large, half-circular, stone wall located immediately south of the clubhouse, is of uncertain purpose but remains on the site as does the dry laid stone retaining wall along the building's façade. An octagonal concrete "fountain" of uncertain history is located immediately below the retaining wall. The Clubhouse, as documented in available images, was demolished sometime after 1929, with the site later occupied by House 1

[66] "The Light House," *Mail Tribune*, 1-September-1963, Section B, 1:1-6.
[67] "Sportsmen's Club Organized," *Mail Tribune*, 25-September-1903, 1:3.

and House 2. While the Clubhouse no longer survives, the stone retaining walls associated with its development remain.

12. *House 1 (c1935-1972)*: A gable-roof bungalow style volume with daylight basement, this structure was built circa 1935 as worker housing. Of wood frame construction with a full width front porch facing the river, House 1 survived until 1972 when it was demolished by Pacific Power & Light prior to transfer to Jackson County (See Figure 14).

13. *House 2 (c1935-1972):* Identical in construction to House 1, this structure remained after transfer to Jackson County and was rented out on a monthly basis to a property caretaker beginning in 1983. A small garage was located to the north. House 2 was demolished due to poor condition in 2000.[68]

14. *Switchyard (1904-1972)*: Several outdoor switchyard or substations were located on the east bank of the forebay, typified by vertical poles and transformer canisters at grade. These features likely served as starting points for the several transmission lines that connected the Gold Ray project to municipal and industrial users. Numbered Copco transmission lines survived throughout operation and PacifiCorp documentation indicates at least one switchyard remained until the end of operation in 1972. It was removed prior to transfer of the project to public ownership. While the switchyard no longer survives, footings associated with it are assumed to remain as part of Item No. 17.

15. *Transformer Building 1 (c1904):* A small concrete volume with a hipped roof and arched opening to the east, this volume was located within the Forebay and remained at least as late as 1941. Available images document its removal prior to December 1962 (See Figures 5, 7, 9, 11 and 14).

16. *Transformer Building 2 (c1910)*: This two story gable volume, assumed of frame construction with metal siding, was located on the east bank of the forebay, slightly north of the 1941 dam, adjacent to the switchyard. This volume appears in early, c1910 images. Given its shape, limited windows, and location, it is assumed to have been a transformer building but such is not documented. The building was removed by December 1962 (See Figures 9, 11 and 14).

[68] French, letter to Paul Korbulic, 17-Jan-2000, in Jackson County Public Works records.

17. *Bridge(s): (1903-1964):* Built during original construction in 1903, the first bridge at Gold Ray was a simple wooden span rising from timber-crib piers and was located down stream from the powerhouse. The bridge had an open wood rail and connected the project road system with what is now Gold Ray Road, on the opposite shore, spanning the railroad track that lined the channel. The wooden bridge was replaced in 1905 with a more substantial span that replaced the timber cribs with poured concrete piers. (Medford Mail, 14-July-1905). Several early postcard views show a steel through truss as the central span, probably built by 1910. Later photographs (1929-1941) show a composite-bridge, with both timber cribbing and concrete piers and superstructure very similar to that of 1905. The Christmas Day Flood of 1964 washed this bridge out entirely, although the eastern pier remains as a sidewall in the spillway, below the forebay bridge. The western pier survives slightly downstream, where its flat surface is a favored platform for fishing.

PART III. SOURCES OF INFORMATION

Architectural Drawings:
Approximately twenty architectural, engineering, and site drawings prepared by the COPCO and its predecessors are in the possession of Jackson County and have been extremely useful in determining the serial changes to the Gold Ray Powerhouse and dam over time. Primarily 24" x 36" in format, drawings date from circa 1904, showing the original generation configuration, through the 1941 construction of the concrete dam.

Early Views
Gold Ray, including the powerhouse, the original dam, and the surrounding industrial development was a popular subject in booster-type materials prior to World War I, resulting in literally dozens of postcard views that document the project during the pre-1920 period. Copies of these views are available in the collection of the Southern Oregon Historical Society, as well as the author's own collection, and have provided substantial comparative information on the development and history of change at the site. While somewhat problematic and of inexact date, given the serial changes, multiple images support information gleaned from available COPCO plans. Private views from local collections have been collected by Medford historian Ben Truwe, show the dam and the surrounding landscape, including several taken in the post-1950s through 1974 period.

PacifiCorp, based in Portland, as the successor entity to COPCO, the California Oregon Power Company, maintains an extensive archive of images that document the construction of the 1941 dam and its subsequent modifications, including the status of the property subsequent to the 1964 Christmas Day Flood. A small selection of the dozens of PacifiCorp historical images have been included in this document.

Interviews
Few individuals survive with firsthand knowledge of Gold Ray during its operation and none were located during this research. Oral Histories maintained by the Southern Oregon Historical Society (Medford) typically document the social history of the project, as recalled by multiple early Jackson County residents.

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Likely Sources Not Yet Investigated

Due to time limitations, no investigation of FERC records at the National Archives or any materials in the collection of the Oregon Department of Fish and Wildlife relative to this project were identified.

Supplemental Material

The attached figures, including vicinity and site mapping as well as select historic drawings in the possession of Jackson County Road and Parks Department, postcard images from the collection of the author, and historic images courtesy of PacifiCorp, document the development of the Gold Ray Hydroelectric Project and augment the HAER photography of existing conditions.

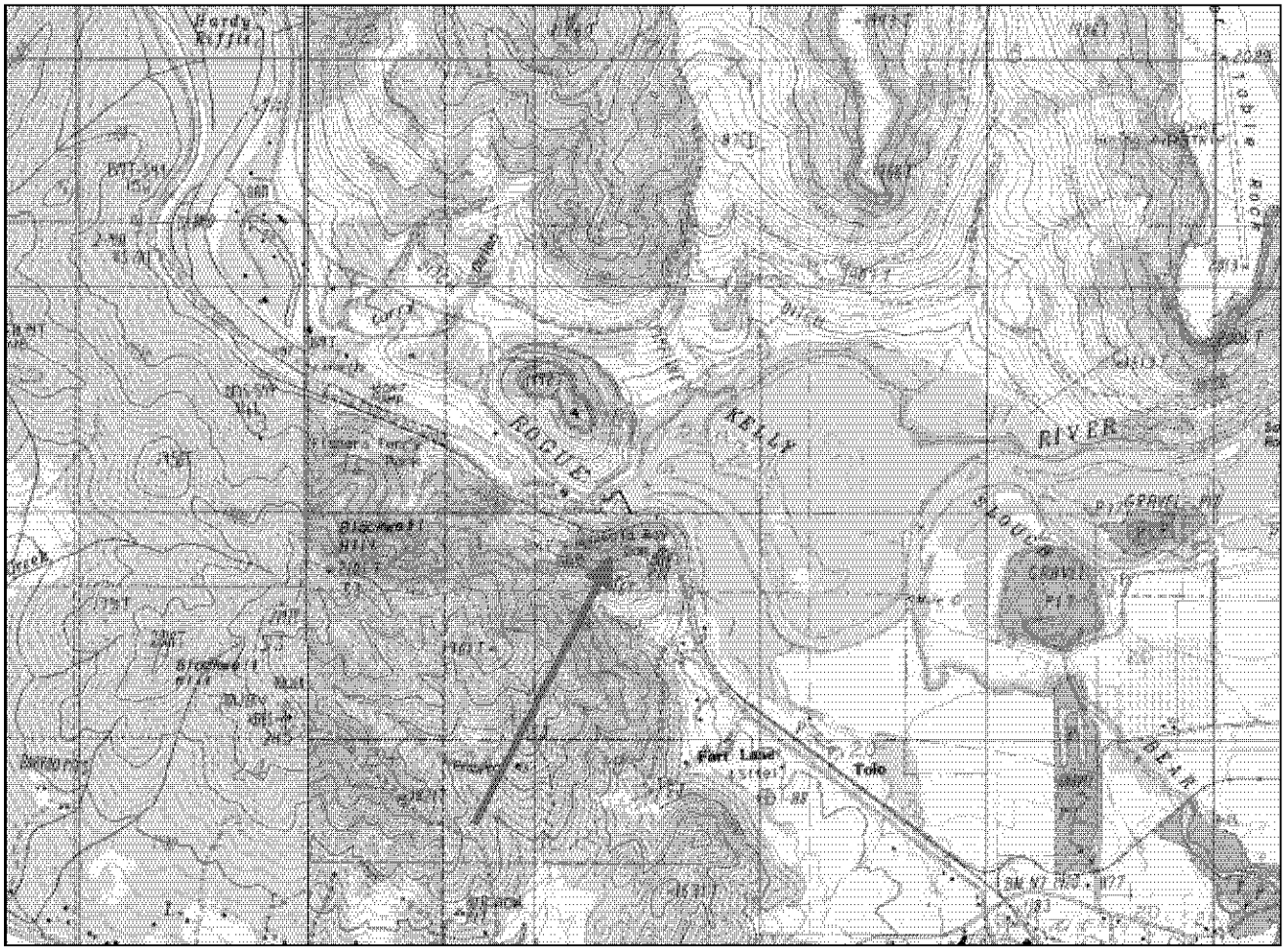

Figure 1. LOCATION MAP, USGS "Eagle Point" 7.5 Min. Quadrangle (1983), Annotated

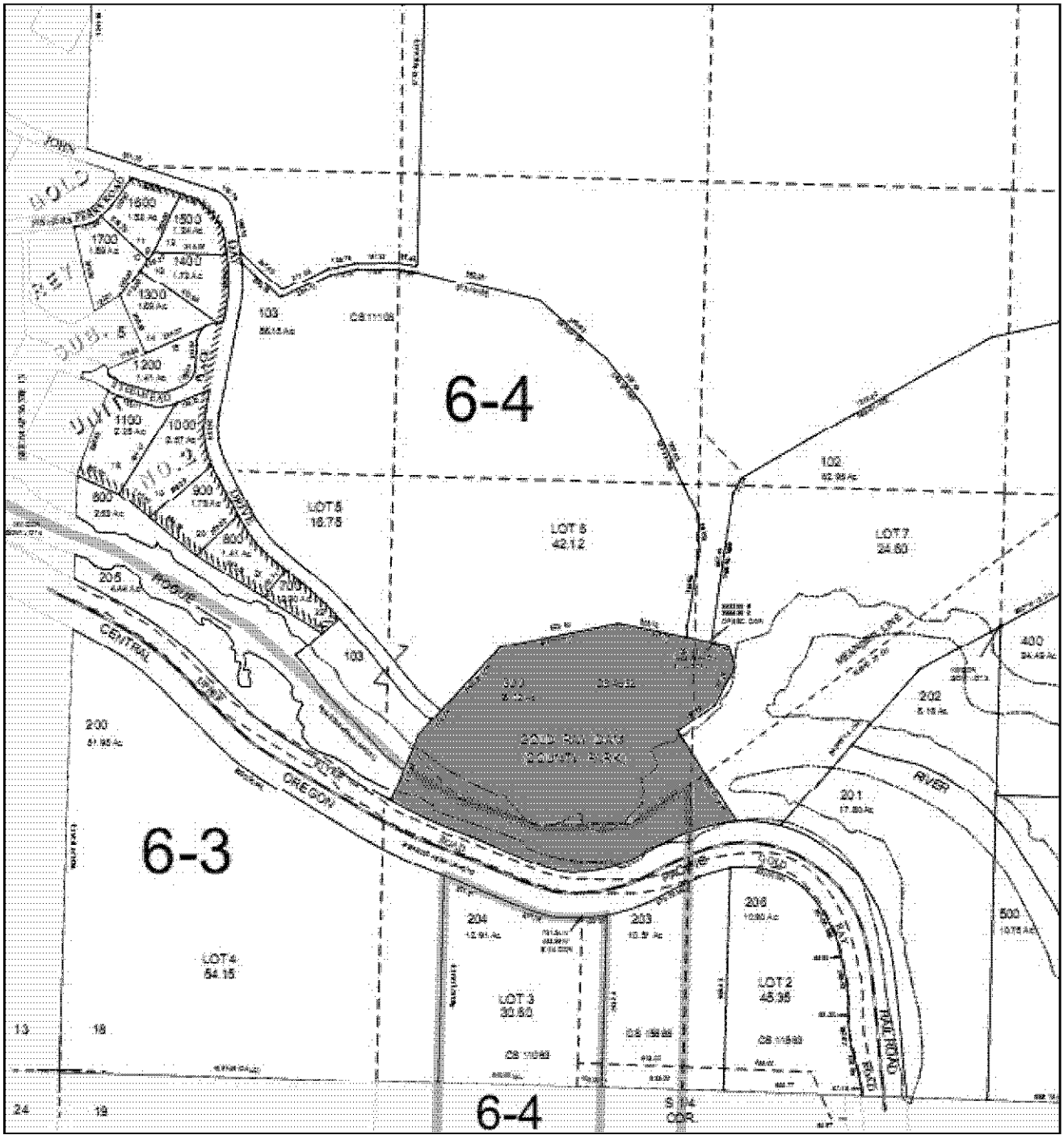

Figure 2. LOCATION MAP, Tax Lot 300, Jackson County Assessor Plat 362W18,

Figure 3. Gold Ray Hydroelectric Project, Historic Resource Locations (Keyed to Resource ID in Part 2)

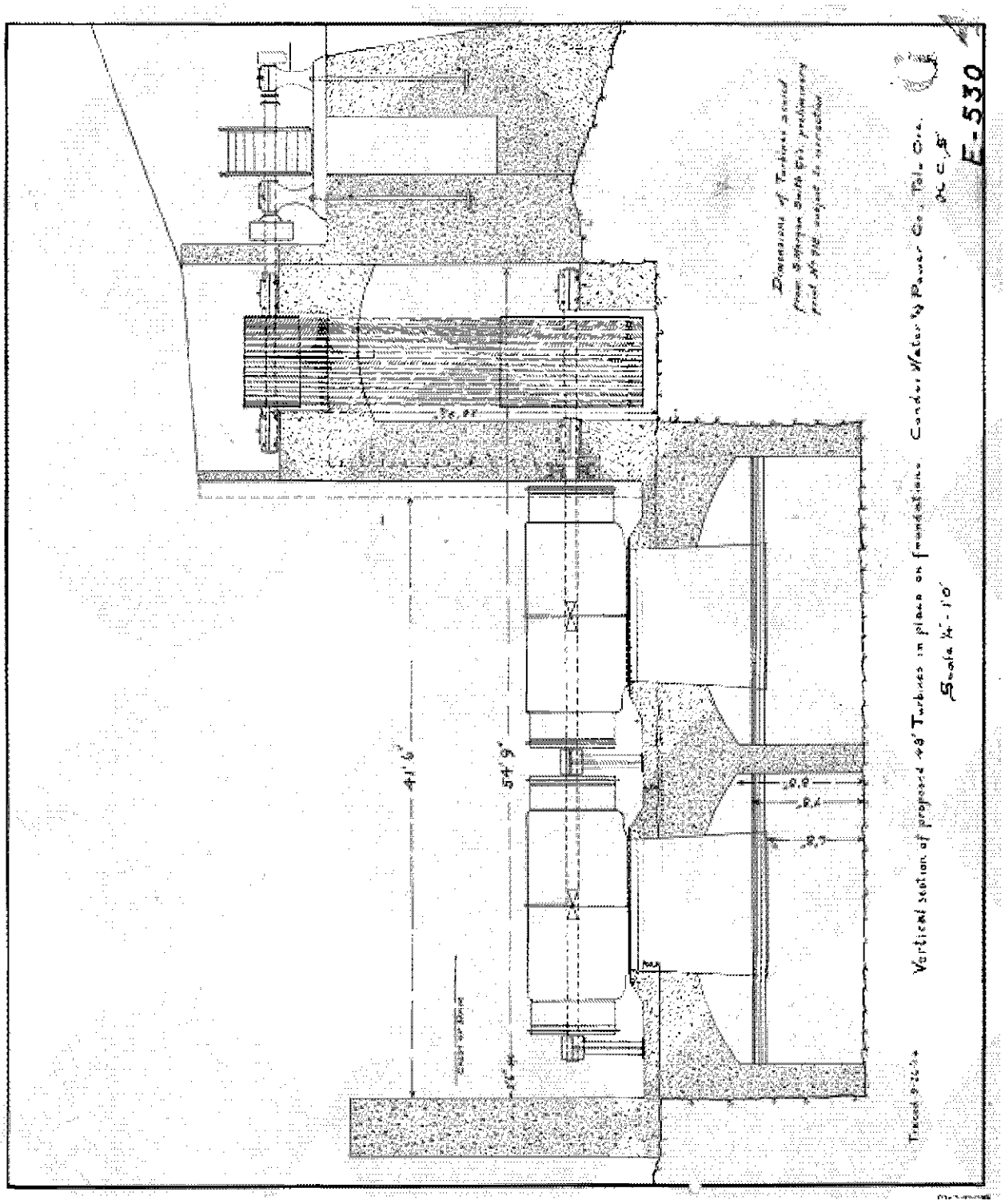

Figure 4. Gold Ray Hydroelectric Project, Power Configuration, 1906 (note horizontal turbines, belt drive), Condor Water Power Company, Tolo, OR, (COPCO Drawing No. E-530) (Jackson County Roads and Parks Collection)

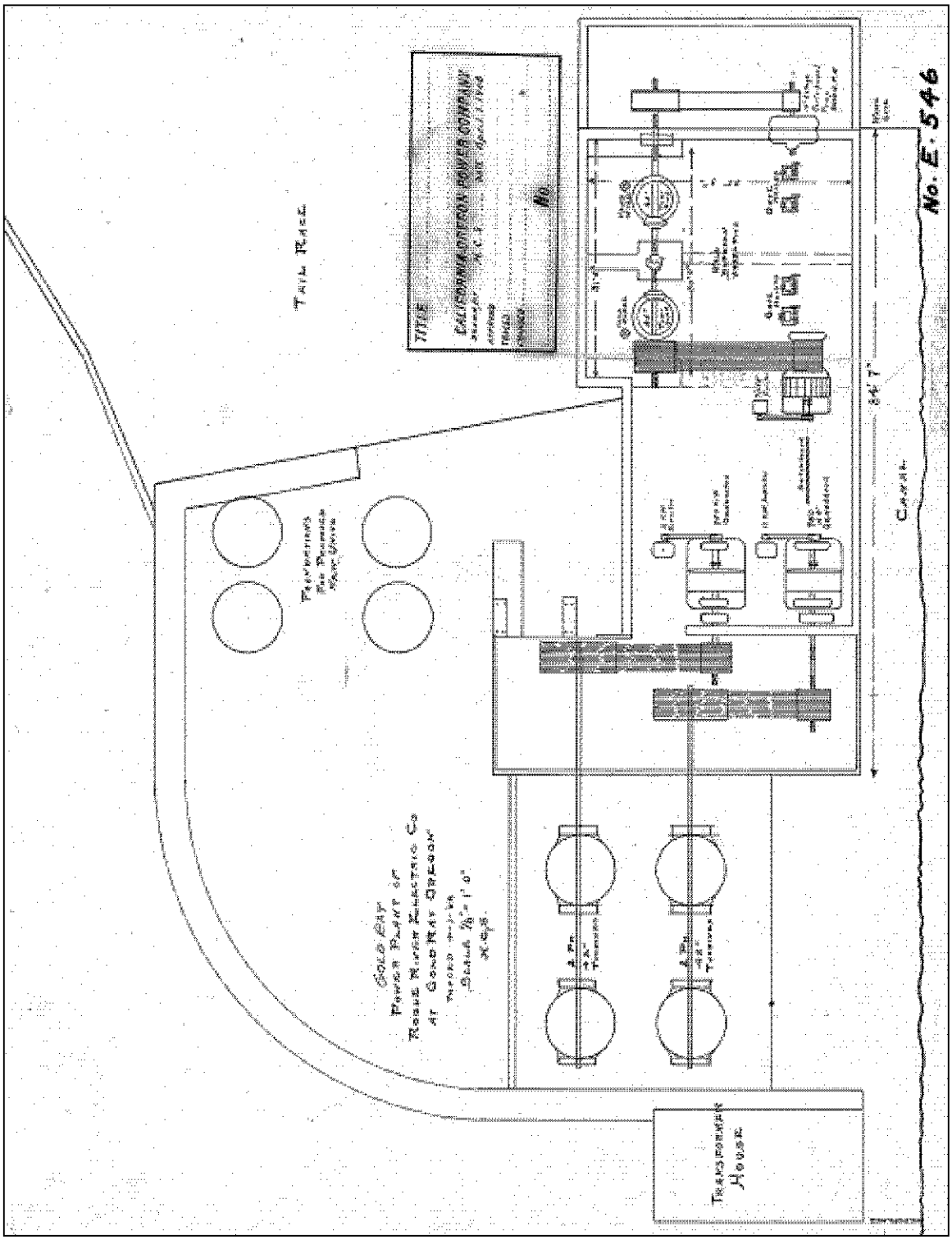

Figure 5. Gold Ray Hydroelectric Project, Modified Power Configuration, 1908 (note Unit No. 3 and centrifugal pump), Rogue River Electric Company, Gold Ray, OR, (COPCO Drawing No. E-546) (Jackson County Roads and Parks Collection)

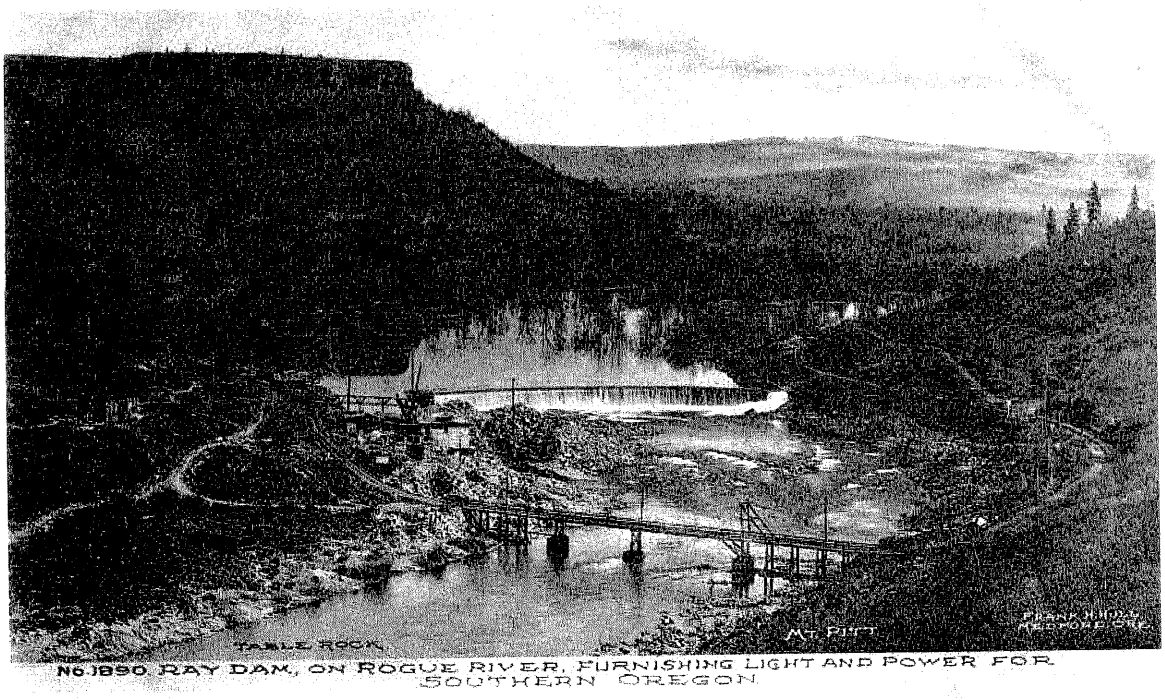

Figure 8. HISTORIC: Ray Dam, looking east toward Table Rock, c1906 (Postmarked 8/07)
George Kramer Collection

Figure 9. HISTORIC: Gold Ray Dam, looking north, toward "Clubhouse" and Water tower, c1910
George Kramer Collection

Figure 10. HISTORIC: Gold Ray, Oregon, Looking North, towards powerhouse, c1910
George Kramer Collection

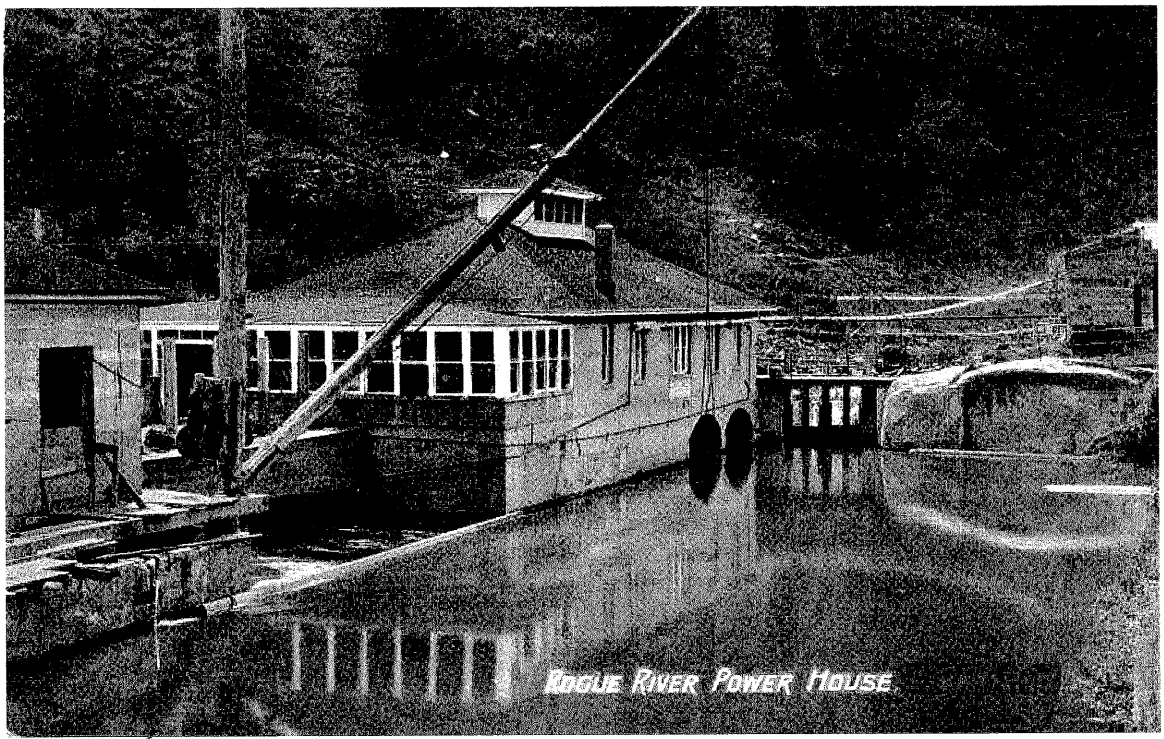

Figure 11. HISTORIC: Rogue River Power House, looking North (from Forebay) c1905
George Kramer Collection